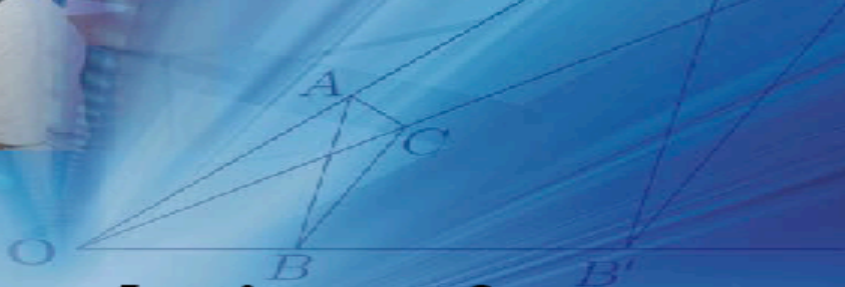


$$\begin{array}{r} 4 \overline{)2581} \\ \underline{796} \\ 796 \\ \underline{+ 58} \\ 854 \end{array}$$



$$3s + 1 = 4 + s$$
$$y \leq 10 - 2x$$



$$67 > 12/3$$

Foundations for Success

$$-\frac{2}{5} \div \frac{1}{4}$$

$$f(x) = x^2 + x - 1$$



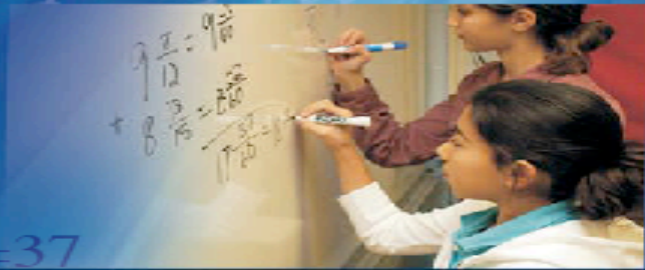
$$y \geq 7x + 15$$



$$3/8 = 37.5\%$$

$$x^2 - y^2 = (x - y)(x + y)$$

$$3x - 1 = 4 + x$$



$$x^2 = \frac{5}{2}$$
$$c = \sqrt{37}$$

$$61 - 24 = 37$$

$$42 \times 13 = 546$$

National Mathematics Advisory Panel

FINAL REPORT • SPRING 2008

Presidential Executive Order

April 2006

- The Panel will advise the President and the Secretary of Education on the best use of scientifically based research to advance the teaching and learning of mathematics, with a specific focus on preparation for and success in algebra.



Concern: Math Proficiency of U.S. Students

- International comparisons
- Low level of proficiency particularly with fractions (decimals, %, ratio, leading to proportion):
 - on NAEP
 - on state assessments
- Falling proficiency at higher grades
- Heavy remedial demand upon entry into college
- Achievement and opportunity gap

Algebra as a gateway



From the Secretary...

“We must encourage students to take more advanced math and science classes. Employers today need workers with ‘*pocket protector*’ skills – creative problem solvers with strong math and science backgrounds.”

Margaret Spellings, June 21, 2007

In short, Nerds rock!!!!



6 4 8 x 5 7 ÷ 1 3 9 1 + 2

My task...

- Two years of challenging work
- 45 recommendations
- Multiple reports

- 10 minutes....



6 4 8 x 5 7 ÷ 0 3 9 1 + 2

Focus and Coherence of Curricular Content

Grades PreK-8:

- Focus on the Critical Foundations for Algebra
 - Proficiency with Whole Numbers
 - Proficiency with Fractions (fractions, decimals, percent)
 - Particular Aspects of Geometry and Measurement
- Revise the curriculum to avoid approaches that continually revisits topics without closure



Curricular Content

Benchmarks Should Guide:

- Classroom Curricula
- Mathematics Instruction
- Textbook Development
- State Assessment



What Algebra? When?

- Grade level?
- Background?
- Who's teaching?
- The Misplaced Math Student – Lost in 8th Grade Algebra...



6 4 8 x 5 7 ÷ 1 3 9 1 + 2

Curricular Content

The Major Topics of School Algebra

Covering all of school algebra traditionally extending over two courses, Algebra I and Algebra II or within Integrated Curricula:

- Symbols and Expressions
- Linear Equations
- Quadratic Equations
- Functions
- Algebra of Polynomials
- Combinatorics and Finite Probability



Learning Processes

Scientific Knowledge on Learning and Cognition Needs to be Applied to the Classroom to Improve Student Achievement:

- Most children develop considerable knowledge of mathematics before they begin kindergarten.
- Children from families with low incomes, low levels of parental education, and single parents often have less mathematical knowledge when they begin school than do children from more advantaged backgrounds. This tends to hinder their learning for years to come.
- There are promising interventions to improve the mathematical knowledge of these young children before they enter kindergarten.



Learning Processes

- To prepare students for Algebra, the curriculum must simultaneously develop conceptual understanding, computational fluency, factual knowledge and problem solving skills.



Learning Processes

Children's goals and beliefs about learning are related to their mathematics performance.

- Children's beliefs about the relative importance of effort and ability can be changed.
- Effort matters!
- Anecdotal comment – forget the math gene stuff and be rid of the Parent-Teacher conference nightmare!



Teachers and Teacher Education

Mathematically Knowledgeable Classroom Teachers Have a Central Role in Mathematics Education.

- Evidence shows that a substantial part of the variability in student achievement gains is due to the teacher.
- Less clear from the evidence is exactly what it is about particular teachers—what they know and do—that makes them more effective.
- The mathematics preparation of elementary and middle school teachers must be strengthened as one means for improving teacher effectiveness in the classroom



Teachers and Teacher Education

- Currently there are multiple pathways into teaching.
 - Research indicates that differences in teachers' knowledge and effectiveness between these pathways are small or non-significant compared to very large differences among the performance of teachers within each pathway.
- The Panel recommends that research be conducted on the use of full-time mathematics teachers in elementary schools, often called elementary math specialist teachers.



Instructional Practices

Instructional practice should be informed by high quality research, when available, and by the best professional judgment and experience of accomplished classroom teachers.

- All-encompassing recommendations that instruction should be student-centered or teacher-directed are not supported by research.



Instructional Practices

Use of technology shows promise when:

- Computer-assisted instruction supports drill and practice
- Well designed tutorials are delivered through computer-assisted instruction
- Learning is supported by the careful, targeted application of computer programming

More research is needed

Amazingly frustrating...



Instructional Materials

- U. S. mathematics textbooks are far too long -- often 700-1000 pages. Mathematics textbooks are much smaller in many nations with higher mathematics achievement than the U.S. Excessive length makes our books unnecessarily expensive and tends to undermine coherence and focus.
- Publishers must ensure the mathematical accuracy of their materials.



Assessment

- NAEP and state tests must focus on the mathematics that students should learn, with scores reported and tracked over time.
- States and NAEP need to develop better quality control and oversight procedures to ensure that test items:
 - Are of the highest quality.
 - Measure what is intended.
 - Do not include design or wording problems that provide unintended sources of difficulties.



Next Steps

- Release of the Final Report – March 13, 2008
- Publication of Final Report – June, 2008
- Publication of Task Group and Subcommittee Reports
- Expiration of the National Mathematics Advisory Panel - April 18, 2008
- National Forum – 1st Forum held October 5-6, 2008
- Other “steps” – testimony, Doing What Works, additional support materials...



Thank you

Questions??



6 4 8 x 5 7 ÷ 0 3 9 1 + 2